Appendix A

Sampling SOPs

SURFICIAL SEDIMENT SAMPLING
USING A PONAR DREDGE SAMPLER
ONBOARD THE *R/V MUDPUPPY*

Overview
The following Standard Operating Procedure (SOP) explains the technique for collecting sediment samples using a ponar dredge sampling device. The procedures cover the following activities:

- Positioning of Vessel
- Securing the Vessel for Sampling
- Sample Collection Procedures

NOTE: This SOP only illustrates the technique for collecting surficial sediment samples (i.e., to an approximate depth of 6 inches). Details regarding the labeling and transport of sediment samples should be address by individual project leads in the project specific Quality Assurance Project Plan (QAPP).

Sample Handling and Preservation
Due to the expense of operation a vessel to collect sediment samples and the costs of analytical sample analysis, every sediment sample is considered important. Any contamination through mishandling or lack of preservation could cause biases in data results.

The following considerations should be addressed.

- At a minimum, nitrile gloves and Saranac coveralls should be worn during sampling and sub-sampling activities.
- Sample containers must be kept free of contamination and should remain sealed until use.
- Preservatives should be fresh and labeled.
- Samples should be stored in coolers and freeze packs or ice as soon as possible.
- Cooler temperatures should be checked at a minimum frequency of twice a day to ensure that the appropriate temperature is maintained.
- Mode of sample transport must maintain the integrity of the samples.

Safety
In any field operation, emphasis should be placed on safety. Site operators must be aware of the potential safety hazards to which they will be subjected. The Great Lakes National Program Office has developed a safety manual specific to R/V Mudpuppy operations. All personnel on board must be familiar with the contents of this document prior to implementing any data collection activities. Additionally, onboard personnel must follow all safety protocols and equipment guidelines, and be prepared for emergency situations. The ship's captain is the primary authority during vessel operations. The Captain is also responsible for determining whether a sampling activity will be undertaken during inclement weather. Sampling personnel are responsible for their safety from potential hazards including, but not limited to:

- **Electrical Hazards.** For obvious hazards or problems (fire, scorching, blown fuses, etc.), turn off power for the circuit involved and notify the Captain who will take the lead in responding to the hazard. Never attempt electrical repairs.
- **Personal Protective Equipment**. Sampling personnel should be prepared to work with large and/or heavy equipment where safety shoes, head, hand, protective

clothing (Tyvek or Saranac suits), and eye protection are necessary. Some sites may require respirators. Sampling personnel should have clothing available in the event of weather extremes.

- **Sampling Equipment**. Never force glassware with unprotected hands. Care should be taken around the sampling equipment to avoid injuries and slipping overboard while positioning sampling equipment.
- **Chemical Dangers**. Organic solvents and acids are occasionally used to decontaminate sampling equipment. These materials should not be ingested nor come into contact with bare skin or flames (if flammable). Sampling personnel should be familiar with the Material Safety Data Sheets for each and every chemical used during sampling.

Equipment and Supplies

The following equipment and supplies are required for the collection of a single sediment core at a typical sampling location.

- Ponar Dredge Sampler
- Winch
- Stainless Steel Bowls, Spoons, and Spatulas
- High Density Polyethylene (HDPE) Sediment Sample Bottles[(1)]
- Glass Sample Bottles (for Organic Contaminant Samples) [(1)]
- Coolers/Ice Chests[(1)]
- Sample Labels[(1)]
- Indelible Markers and Pencils[(1)]
- Global Positioning System or Locational Equipment
- Generator (230 Volt, 60 Hz, 3-Phase, 14 Amps)
- Safety Equipment (including: Hard Hat with Face Shield, gloves, safety glasses[(2)], Saranac/Tyvek suit, Steel-Toed Boots[(2)], and Boot Covers)

Notes:

[(1)] Must be provided by Grantee

[(2)] Must be provided by each individual user

Sample Collection Procedures

A sampling activity may consist of collecting more than one type of sample at a particular site. This procedure will detail the collection of surficial sediment samples (to an approximate depth of 6 inches) from a single location. When benthic organism samples are being collected at the same site, it is important to collect the benthic organism samples prior to the collection of sediment samples in order to minimize the disturbances to the benthic organisms.

Every attempt should be made to stabilize the vessel as much as possible in order to collect vertical sediment cores. When the vessel is moving, the cores may enter the sediments at an angle.

Sample Location

The sample location may be defined either prior to sampling, where the R/V Mudpuppy would be destined for a specific location, or the site may be selected during the sampling process. Generally, sites can be located with an onboard GPS system that is accurate to within 1-3 meters. If the vessel is headed to a pre-determined site, the locational equipment shall be used to locate the site. However, the actual locational readings for the site should be recorded after the vessel is

anchored at the sampling site since waterway conditions, obstructions, boat traffic, or other circumstances may influence the exact sampling location. The ultimate location of the sample collection shall be determine by the Captain of the R/V Mudpuppy in consultation with the sampling crew.

Securing the Vessel

Once at the sampling site, the vessel must be secured in order to avoid drifting and rotation that could cause the coring device to enter the sediment at an angle.

Procedures are as follows:

- Triple anchor the vessel as instructed by the Captain
- Establish the exact sampling location with locational equipment (if location does not need to be accurately predetermined, the reading can be taken during sampling activities).

Sampling Procedures - Ponar Dredge Sampler

The following sampling procedure is used to collect surficial sediment samples on the R/V Mudpuppy.

1. Measure and Record Water Depth.
2. Remove the straight (locking) bolt from the sampler, place Ponar into its open position and insert the spring loaded bolt into the assembly.
3. Lift the ponar sampler into a vertical position using the Winch so that the sampler is Suspended Just Off of the Bow of the Sampling Vessel.
4. Lower the sampler with the winch until the sampler is imbedded in the sediments.
5. Using your hands, pull up on the winch cable to close the sampler and raise the ponar above the sediment surface.
6. Maintain hand tension on the cable while slowly reversing the winch to remove the slack from the cable.
7. Slowly lift the sampler back above the water surface until the sampler is in a vertical position Just Off of the Bow of the Sampling Vessel
8. Tip the ponar sampler to drain excess water from the sample.
9. Place a stainless steel bowl under the ponar sampler and lower the sampler into the bowl.
10. Press down on hinge arms to open sampler and discharge the sediment sample.
11. Replace straight (locking) bolt into the ponar sampler and set aside.
12. Handle and Subsample the Sediment sample as described in the QAPP.
13. Wash the sampler, bowl, spoons, deck, and other equipment using site water pump through onboard garden hoses or include other decontamination as required by the project QAPP. (Note: The R/V Mudpuppy and its crew supplies only site water and hoses for decontamination. Accompanying personnel are responsible for providing all other decontamination equipment and supplies required by the QAPP.)

LONG CORE SEDIMENT SAMPLING USING A VIBRO-CORER ONBOARD THE *R/V MUDPUPPY*

Overview

The following Standard Operating Procedure (SOP) explains the technique for collecting sediment core samples (up to 15 feet in length) using a Rossfelder Vibro-corer. The procedures cover the following activities:

- Positioning of Vessel
- Securing the Vessel for Sampling
- Sample Collection Procedures

Questions regarding sampling methods or operation of sampling equipment should be directed to:

Dr. Marc Tuchman
U.S. EPA Great Lakes National Program Office
77 West Jackson Blvd. (G-17J)
Chicago, IL 60604
Phone: 312/353-1369
Fax: 312/353-2018

NOTE: This SOP only illustrates the technique for sampling and sub-sampling long sediment core samples (i.e., up to 15 feet in length). Details regarding the labeling and transport of sediment samples should be address by individual project leads in the project specific Quality Assurance Project Plan (QAPP).

Sample Handling and Preservation

Due to the expense of operation a vessel to collect sediment samples and the costs of analytical sample analysis, every sediment sample is considered important. Any contamination through mishandling or lack of preservation could cause biases in data results.

The following considerations should be addressed.

- At a minimum, nitrile gloves and Saranac coveralls should be worn during sampling and sub-sampling activities.
- Sample containers must be kept free of contamination and should remain sealed until use.
- Preservatives should be fresh and labeled.
- Samples should be stored in coolers and freeze packs or ice as soon as possible.
- Cooler temperatures should be checked at a minimum frequency of twice a day to ensure that the appropriate temperature is maintained.
- Mode of sample transport must maintain the integrity of the samples.

Safety

In any field operation, emphasis should be placed on safety. Site operators must be aware of the potential safety hazards to which they will be subjected. The Great Lakes National Program Office has developed a safety manual specific to R/V Mudpuppy operations. All personnel on board must be familiar with the contents of this document prior to implementing any data collection activities. Additionally, onboard personnel must follow all safety protocols and equipment guidelines, and be prepared for emergency situations. The ship's captain is the primary authority during vessel operations. The Captain is also responsible for determining whether a sampling activity will be undertaken during inclement weather. Sampling personnel are responsible for their safety from potential hazards including, but not limited to:

- **Electrical Hazards.** For obvious hazards or problems (fire, scorching, blown fuses, etc.), turn off power for the circuit involved and notify the Captain who will take the lead in responding to the hazard. Never attempt electrical repairs.
- **Personal Protective Equipment**. Sampling personnel should be prepared to work with large and/or heavy equipment where safety shoes, head, hand, protective clothing (Tyvek or Saranac suits), and eye protection are necessary. Some sites may require respirators. Sampling personnel should have clothing available in the event of weather extremes.
- **Sampling Equipment**. Never force glassware with unprotected hands. Care should be taken around the sampling equipment to avoid injuries and slipping overboard while positioning sampling equipment.
- **Chemical Dangers**. Organic solvents and acids are occasionally used to decontaminate sampling equipment. These materials should not be ingested nor come into contact with bare skin or flames (if flammable). Sampling personnel should be familiar with the Material Safety Data Sheets for each and every chemical used during sampling.

Equipment and Supplies

The following equipment and supplies are required for the collection of a single sediment core at a typical sampling location.

- Vibrocorer
- Rolling Box for Vibrating Head
- Winch
- 4" Acetate Butyrate Core Tubes
- Stainless Steel Bowls, Spoons, and Spatulas
- High Density Polyethylene (HDPE) Sediment Sample Bottles[(1)]
- Glass Sample Bottles (for Organic Contaminant Samples) [(1)]
- Coolers/Ice Chests[(1)]
- Sample Labels[(1)]
- Indelible Markers and Pencils[(1)]
- Global Positioning System or Locational Equipment
- Generator (230 Volt, 60 Hz, 3-Phase, 14 Amps)
- Heavy Duty Riveter and Steel Rivets
- Battery Powered Cordless Drill
- Battery Powered Cordless Saw
- Safety Equipment (including: Hard Hat with Face Shield, gloves, safety glasses[(2)], Saranac/Tyvek suit, Steel-Toed Boots[(2)], and Boot Covers)
- Core Caps

Notes:

[(1)] Must be provided by Grantee

[(2)] Must be provided by each individual user

Sample Collection Procedures

A sampling activity may consist of collecting more than one type of sample at a particular site. This procedure will detail the collection of long sediment core samples (up to 15 feet) from a single location. When benthic organism samples are being collected at the same site, it is

important to collect the benthic organism samples prior to the collection of sediment samples in order to minimize the disturbances to the benthic organisms.

Every attempt should be made to stabilize the vessel as much as possible in order to collect vertical sediment cores. When the vessel is moving, the cores may enter the sediments at an angle.

Sample Location

The sample location may be defined either prior to sampling, where the R/V Mudpuppy would be destined for a specific location, or the site may be selected during the sampling process. Generally, sites can be located with an onboard GPS system that is accurate to within 1-3 meters. If the vessel is headed to a pre-determined site, the locational equipment shall be used to locate the site. However, the actual locational readings for the site should be recorded after the vessel is anchored at the sampling site since waterway conditions, obstructions, boat traffic, or other circumstances may influence the exact sampling location. The ultimate location of the sample collection shall be determine by the Captain of the R/V Mudpuppy in consultation with the sampling crew.

Securing the Vessel

Once at the sampling site, the vessel must be secured in order to avoid drifting and rotation that could cause the coring device to enter the sediment at an angle.

Procedures are as follows:

- Triple anchor the vessel as instructed by the Captain
- Establish the exact sampling location with locational equipment (if location does not need to be accurately predetermined, the reading can be taken during sampling activities).

Sampling Procedures - Vibrocorer

The following sampling procedure is used to collect long core sediment samples on the R/V Mudpuppy.

1. Measure and Record Water Depth.
2. Lift the Vibrating Head into a vertical position using the Winch so that the Vibrating Head is Suspended Just Off of the Bow of the Sampling Vessel.
3. Insert the Core Tube into the Vibrating Head, Making sure that the Tube Slides into the Check Valve.
4. Tighten the Collar to the Vibrocorer (Two Bolts on Each Side of the Assembly).
5. Lower the Entire Assembly until th Core Nose is just above the Sediment Surface. Turn on the Generator and the Vibrating Head.
6. Slowly Lower the Vibrocorer by Running Out 6-10 Inches of Cable at a Time. Monitor Core Tube Penetration by Feeling for Slack in the Cable.
7. When the Vibrocorer Ceases to Penetrate the Sediment (i.e., the Unit stops Lowering or is "Refused"), or the Vibrating Head is Near the Sediment Surface, Reverse the Winch and Pull the Unit from the Sediment. Do Not Allow the Vibrating Head to become Imbedded in the Sediment.
8. Turn off Power to the Vibrating Head and the Generator when the Core "Breaks Free" of the Sediment Surface.

9. Lift the Entire Assembly so that the Sediment/Water Interface is Visible. Drill Holes through the Core Tube at the Sediment/Water Interface to Decant Water from the Tube.
10. Disengage the Core Tube.
11. Lay Sediment Core on the Deck of the Vessel, Saw off the Excess Core Tube at the Sediment Surface and Cap the Top of the Tube with a Red Cap Plug.
12. Lower the vibracore head back into its holding cart.
13. Handle and Subsample the Sediment Core as Desired, Either On-Board the R/V Mudpuppy or at a Shore Location. (R/V Mudpuppy is equipped to roughly section the sediment core into sub-sections of six (6) inches or greater using a battery powered circular saw. Subsamples can be homogenized onboard using stainless steel bowls and spoons.)
14. Dispose of excess sediments back into the water body.
15. Wash the sampler, bowl, spoons, deck, and other equipment using site water pump through onboard garden hoses or include other decontamination as required by the project QAPP. (Note: The R/V Mudpuppy and its crew supplies only site water and hoses for decontamination. Accompanying personnel are responsible for providing all other decontamination equipment and supplies required by the QAPP.)